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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/560,469	04/28/2000	JOSEPH A FERNANDO	UNF-9058-A	3786

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EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	PAPER NUMBER
1797	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/560,469	FERNANDO ET AL.	
	Examiner	Art Unit	
	JENNIFER A. LEUNG	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-13,16-27,41-44 and 47-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-13,16-27,41-44 and 47-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 26, 2009 has been entered.

Status of the Claims

2. Applicant's amendment filed on January 26, 2009 has been considered. Claims 3, 4, 14, 15, 28-40, 45 and 46 are cancelled. Claims 1, 2, 5-13, 16-27, 41-44 and 47-57 are under consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833).

Regarding claims 1, 8, 9, 12, 19-25, 47, 52, 53, 56 and 57, Robinson et al. (see FIG. 1; column 4, line 55 to column 7, line 40) discloses a device **10** comprising:

a housing **12** having an inlet **14** at one end and an outlet (not shown) at an opposite end through which exhaust gases flow; a fragile structure (i.e., monolith **18**) resiliently mounted within said housing, said fragile structure having an outer surface and an inlet end surface at one end in communication with said inlet **14** and an outlet end surface at an opposite end in communication with said outlet; and a support element (i.e., a mounting mat **20**) disposed between the housing **12** and the fragile structure **18**, said support element **20** comprising an integral, substantially non-expanding ply of polycrystalline ceramic fibers comprising about 40 weight percent to about 60 weight percent alumina and about 60 weight percent to about 40 weight percent silica (see column 5, lines 33-64). The support element **20** further comprises a sacrificial binder (see column 5, lines 33-36; column 6, lines 3-26).

The apparatus of Robinson et al. is the same as the instantly claimed apparatus, except that Robinson et al. is silent as to the ceramic fibers of the support element **20** comprising ceramic fibers which possess the physical properties of fibers that are formed according to the claimed time-temperature heating regimen.

Myles, however, teaches a ceramic fiber, suitable for forming a fiber blanket or mat to be used in a high temperature apparatus (see column 3, line 65 to column 4, line 10), wherein said ceramic fiber is melt-formed and comprises about 40 wt.% to about 60 wt.% alumina and about

60 wt.% to about 40 wt.% silica (see column 2, lines 36-40). In particular, the ceramic fiber is prepared according to a time-temperature regimen of heating said fibers to a temperature of 990°C to at least 1050°C for greater than 1 hour, or heating said fibers to a sufficient temperature above the devitrification temperature of the fiber material for an effective amount of time to produce a microcrystalline fiber (see column 3, lines 12-64).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the heat treated, melt formed ceramic fibers of Myles for the ceramic fibers present in the support element **20** in the apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the ceramic fibers of Myles retain sufficient flexibility and show dramatically less shrinkage under high temperature use (see column 6, lines 4-11). Furthermore, the substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958); and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 550 U.S. --, 82 USPQ2d 1385 (2007).

Given that the time-temperature regimen as taught by Myles is identical to or substantially identical to the time-temperature regimen being claimed by Applicants, the heat treated ceramic fibers of Myles will be identical to or substantially identical to the instantly claimed ceramic fibers having a crystallite size of greater than 200 Å to about 500 Å, and a crystallinity from about 5 to 50 percent.

And, even if the properties were not inherent, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select the appropriate time and temperature parameters for producing a ceramic fiber having the instantly claimed physical properties of crystallinity and crystallite size in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the specific crystallinity and crystallite size are not considered to confer patentability to the claim since the precise crystallinity and crystallite size would have been considered a result effective variable by one having ordinary skill in the art (see Myles: column 3, lines 21-58). Accordingly, one having ordinary skill in the art would have routinely optimized the heating time and temperature ranges for producing a suitable crystallinity and crystallite size in the polycrystalline ceramic fibers, to obtain the desired flexibility and shrink resistance, for instance, in the support element/mat for holding the fragile structure in Robinson et al., *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Because the modified apparatus of Robinson et al. comprises all of the instantly claimed components, the support element will inherently exhibit the specified minimum residual pressures for holding the fragile structure within the housing after 200 cycles of testing at 900 °C or after 1000 cycles of testing at 750 °C.

Regarding claims 2, 13 and 48, Robinson et al. further discloses that the fragile structure **18** has a perimeter, at least a portion of which is integrally wrapped by the support element **20** (see FIG. 1; column 9, lines 26-30).

Regarding claims 5, 6, 16, 17, 49 and 50, Myles further teaches that the ceramic fibers have an average diameter ranging from about 1 micron to about 14 microns, or from about 3 microns to about 6.5 microns (see column 2, lines 50-53).

Regarding claims 10, 11, 26, 27, 54 and 55, Robinson et al. further discloses that the device may comprise a catalytic converter or a diesel particulate trap (see column 4 lines 55-62).

4. Claims 7, 18, 41-44 and 51 are rejected under 35 U.S.C. 103(a) as obvious over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833), as applied to claims 1, 9, 12 and 21, and further in view of Sasaki et al. (JP 07-286514).

Regarding claims 7, 18 and 51, Robinson discloses that the ceramic fibers should be substantially shot free, e.g., on the order of about 5 percent nominally or less (see column 5, line 65 to column 6, line 1). Sasaki et al. also teaches a ceramic fiber having a shot content of 5% by weight or less (see section [0007]). It would have been obvious for one of ordinary skill in the art at the time the invention was made to maintain a shot content of less than about 10% in the ceramic fibers forming the support element/mat in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because when larger amounts of shot are present in the ceramic fiber, the specific gravity of portions of the support element/mat increases, and thermal conductivity becomes uneven, resulting in an inability to evenly hold the fragile structure, as taught by Sasaki et al.

Regarding claims 41-44, the collective teaching of Robinson and Myles is silent as to the support element/mat being needled. Sasaki teaches a support element/mat comprising ceramic fibers, in which said support element/mat is needled (see sections [0008], [0009]). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide

needling to the support element/mat in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the needling orients some of the ceramic fibers in the vertical direction to tightly bind the support element/mat, so that the bulk density of the support element/mat is increased and separation or shifting of the layers of the support element/mat can be prevented, as taught by Sasaki et al.

Response to Arguments

5. Applicant's arguments filed January 26, 2009 have been fully considered but they are not persuasive.

A. Comments regarding the rejection of claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 under 35 U.S.C. 103(a) as being unpatentable over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833).

Applicant (page 10, last paragraph, to page 11, first paragraph) argues that there would have been no reasonable expectation of success if the ceramic fibers of Myles were substituted for the ceramic fibers in the support element of Robinson, because Myles does not teach the use of the fibers under a dynamic (e.g., automotive) environment.

Applicant (at page 12, second paragraph) further argues that it would not be predictable that a support element formed from the melt-formed ceramic fibers of Myles would have the adequate holding force required by Robinson, because Myles does not address holding forces.

Applicant (at page 12, last paragraph, to page 13, first paragraph) further argues that,

> "Applicants unequivocally deny that the holding pressure of the currently claimed mounting mat is inherent in the Myles teaching. Resistance to shrinkage is a different and independent property of the material than its ability to provide sufficient holding pressure. The holding pressure of the support element is a result of the heat treatment so

that the element does not experience a permanent compression set."

Applicant's arguments are not found persuasive.

Robinson (see column 3, lines 40-39; see also column 2, lines 38-61) discloses that the characteristics which enable a mounting mat to operate successfully within a catalytic converter, e.g., in an automotive environment, include: i) good handleability and fabrication characteristics; ii) the capability to withstand high temperatures without degradation while maintaining stable pressure over a wide range of operating temperatures, e.g., from a low temperature of about 20 °C to high temperatures of at least about 1200 °C; and iii) flexibility without the need of additional means to maintain structural integrity.

With respect to i) and iii), Myles teaches that the ceramic fibers can be formed into a mat or blanket, and the mat or blanket can be bent in an arc without producing significant cracking or breakage of the fibers (see column 2, lines 23-28; column 3, line 65 to column 4, line 10). With respect to ii), Myles teaches that the ceramic fibers are able to withstand high temperatures without degradation, given its ability to withstand temperatures of up to 1425 °C for 24 hours with minimal shrinkage (see column 2, lines 29-35). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the heat treated, melt formed ceramic fibers of Myles for the ceramic fibers present in the support element **20** in the apparatus of Robinson et al., at least for the reasons that the ceramic fibers of Myles retain sufficient flexibility and show dramatically less shrinkage under high temperature use (see column 6, lines 4-11).

Furthermore, as stated above by Applicant, the "holding pressure" is a result of the heat treatment of the ceramic fibers, so that the support element does not experience a permanent

compression set. Given that the heat treatment regimen of Myles is the same as or obvious over Applicant's own heat treatment regimen, a support element comprising the ceramic fibers of Myles would inherently exhibit the necessary holding pressure. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

The Examiner further asserts that there would have been a reasonable expectation of success in employing the melt-spun and heat treated ceramic fibers of Myles in the support element of Robinson, because the use of melt-spun and heat treated ceramic fibers in dynamic, e.g., automotive, environments was known in the art to be satisfactory (see Langer, US 5,250,269; in IDS submitted April 28, 2000). The prior art to Langer further suggests that one of ordinary skill in the art would have considered ceramic fibers which were commonly used in furnace insulation to be highly relevant in automotive applications (see, e.g., column 1, line 64 to column 2, line 13; also, column 2, lines 51-60; in reference to UK Pat. Spec. No. 1,481,133).

Applicant (at page 11, second paragraph, to page 12, first paragraph; see also, page 15, second paragraph) further argues that there would have been no motivation to substitute the melt-formed ceramic fibers of Myles for the ceramic fibers of the support element in the apparatus of Robinson, because Robinson would be "limited to the use of sol-gel derived fibers", given the disclosed examples of suitable polycrystalline oxide refractory ceramic fibers formed by sol-gel processes, found in U.S. Pat. Nos. 4,159,205 and 4,277,269.

The Examiner respectfully disagrees. Please note that disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred

embodiments. See MPEP 2123.

Lastly, with respect to the newly added limitation of a "sacrificial binder", the primary reference to Robinson discloses that the support element further comprises a sacrificial binder (see column 5, lines 33-35; column 6, lines 3-26).

B. Comments regarding the rejection of claims 7, 18, 41-44 and 51 under 35 U.S.C. 103(a) as obvious over Robinson et al. in view of Myles, as applied to claims 1, 9, 12 and 21, and further in view of Sasaki et al. (JP 07-286514).

Applicant (at page 14, second paragraph, to page 16, first paragraph) argues that the combination of Robinson et al., Myles and Sasaki et al. fails to render the claimed apparatus obvious, because i) Sasaki et al. does not teach, suggest, or provide motivation to heat treat ceramic fibers under the claimed time-temperature regimen, and ii) Sasaki et al. does not teach melt-formed ceramic fibers comprising from about 40 to about 60 weight percent alumina and from about 60 to about 40 weight percent silica.

Applicant's argument is not found persuasive. The Sasaki et al. reference was not relied upon to teach i) or ii). Rather, the Sasaki et al. reference was merely relied upon for its teaching of reducing the shot content in ceramic fibers, in order to maintain a uniform thermal conductivity in the support element/mat (with respect to claims 7, 18 and 51), and its teaching of applying needling to a support element/mat of ceramic fibers, in order to increase its bulk density and prevent the separation or shifting of its layers (with respect to claims 41-44).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571) 272-

1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on (571) 272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Primary Examiner, Art Unit 1797